National Institute of Environmental Health Sciences

A research agenda for helminth diseases of humans: Modelling for control and elimination

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Abstract:

Mathematical modelling of helminth infections has the potential to inform policy and guide research for the control and elimination of human helminthiases. However, this potential, unlike in other parasitic and infectious diseases, has yet to be realised. To place contemporary efforts in a historical context, a summary of the development of mathematical models for helminthiases is presented. These efforts are discussed according to the role that models can play in furthering our understanding of parasite population biology and transmission dynamics, and the effect on such dynamics of control interventions, as well as in enabling estimation of directly unobservable parameters, exploration of transmission breakpoints, and investigation of evolutionary outcomes of control. The Disease Reference Group on Helminth Infections (DRG4), established in 2009 by the Special Programme for Research and Training in Tropical Diseases (TDR), was given the mandate to review helminthiases research and identify research priorities and gaps. A research and development agenda for helminthiasis modelling is proposed based on identified gaps that need to be addressed for models to become useful decision tools that can support research and control operations effectively. This agenda includes the use of models to estimate the impact of large-scale interventions on infection incidence; the design of sampling protocols for the monitoring and evaluation of integrated control programmes; the modelling of co-infections; the investigation of the dynamical relationship between infection and morbidity indicators; the improvement of analytical methods for the quantification of anthelmintic efficacy and resistance; the determination of programme endpoints; the linking of dynamical helminth models with helminth geostatistical mapping; and the investigation of the impact of climate change on human helminthiases. It is concluded that modelling should be embedded in helminth research, and in the planning, evaluation, and surveillance of interventions from the outset. Modellers should be essential members of interdisciplinary teams, propitiating a continuous dialogue with end users and stakeholders to reflect public health needs in the terrain, discuss the scope and limitations of models, and update biological assumptions and model outputs regularly. It is highlighted that to reach these goals, a collaborative framework must be developed for the collation, annotation, and sharing of databases from large-scale anthelmintic control programmes, and that helminth modellers should join efforts to tackle key questions in helminth epidemiology and control through the sharing of such databases, and by using diverse, yet complementary, modelling approaches.

Source: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3335861

Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Meteorological Factors, Precipitation, Temperature

Geographic Feature:

resource focuses on specific type of geography

None or Unspecified

Geographic Location:

resource focuses on specific location

Global or Unspecified

Health Impact:

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Foodborne/Waterborne Disease

Foodborne/Waterborne Disease: Helminthiases

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Adaptation, Mitigation

Model/Methodology:

type of model used or methodology development is a focus of resource

Methodology

Resource Type:

format or standard characteristic of resource

Research Article, Research Article, Review

Timescale:

time period studied

Time Scale Unspecified